

| REVISIONS | | | |
|-----------|--|-----------|-------------------|
| LTR | DESCRIPTION | DATE | APPROVED |
| A | Added lever operating force requirement and eliminated 135 percent calibration tripping time. | 28 Jan 88 | Randy Larson |
| B | Updated document references, edit 6.3. | 22 Aug 00 | Kendall Cottongim |
| C | Deleted part number and substitute PIN, editorial changes, update to latest DSCC drawing format. | 11 DEC 02 | Kendall Cottongim |
| D | Corrected 4.2.1 shock test condition, corrected vendor similar designation or type numbers, update to latest DoD requirements. | 4 Jun 04 | Kendall Cottongim |

CURRENT DESIGN ACTIVITY CAGE CODE 037Z3
DEFENSE LOGISTICS AGENCY
DEFENSE SUPPLY CENTER COLUMBUS
COLUMBUS, OHIO 43218-3990

THE ORIGINAL FIRST PAGE OF THIS DRAWING HAS BEEN REPLACED.

Prepared in accordance with ASME Y14.100Selected item drawing

| | | | | | | | | | | | | | | | | | | | | | | |
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|---|-----------------------------|--------------------------|---|--|
| PMIC N/A | PREPARED BY Dan McGrath | | DESIGN ACTIVITY DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OH 45444-5000 | |
| Original date of drawing 31 Aug 1987 | CHECKED BY Dan McGrath | | TITLE CIRCUIT BREAKERS, MAGNETIC, LOW-POWER, SEALED, TRIP-FREE, SHOCK ENHANCED, THREE-POLE, AUXILIARY CONTACTS | |
| | APPROVED BY D. E. Morgan | | | |
| | SIZE A | CODE IDENT. NO. 14933 | DWG NO. 87059 | |
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1. SCOPE

1.1 Scope. This drawing describes the requirements for a family of circuit breakers with shock enhancement for use in overcurrent protection.

1.2 Part or Identifying Number (PIN). The complete PIN is as follows:



2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract(see 6.2).

DEPARTMENT OF DEFENSE SPECIFICATIONS

| | | |
|---------------|---|--|
| DOD-D-1000 | - | Drawing, Engineering and Associated List. |
| MIL-PRF-39019 | - | Circuit Breakers, Magnetic, Low-Power, Sealed, Trip-Free, General Specification for. |

(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or <http://www.dodssp.daps.mil> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

SOCIETY OF AUTOMOTIVE ENGINEERS, INC. (SAE)

AMS-QQ-N-290 - Nickel Plating (Electrodeposited).

(Copies of this document are available from <http://www.sae.org> or Society of Automotive Engineers, Inc. (SAE), 400 Commonwealth Drive, Warrendale, PA 15096.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Drawing precedence. This drawing takes precedence over documents referred to herein and shall be interpreted in accordance with DOD-D-1000.

3.2 Voltage and frequency rating. 50 V dc, maximum and 240 V ac, maximum at 60 and 400 Hz.

3.3 Current rating. See table I.

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3.4 Interface and physical dimensions. See figure 1.

3.5 Time delay. Time delay shall be in accordance with table I, table II, and table III.

3.6 Shock.

3.6.1 Shock (100 g's). When circuit breakers are tested as specified in 4.2.1, main circuit breaker contacts shall not trip. There shall be no closing of open main contacts, nor opening of closed main contacts in excess of 10 μ s duration, nor shall there be any evidence of mechanical or electrical damage.

3.6.2 Shock (150 g's). When circuit breakers are tested as specified in 4.2.2, the main circuit breaker contacts shall not trip. There shall be no evidence of mechanical or electrical damage.

3.6.3 Shock (200 g's). When circuit breakers are tested as specified in 4.2.3, the main circuit breaker contacts shall not trip. There shall be no evidence of mechanical or electrical damage.

3.7 Endurance. Endurance shall be in accordance with MIL-PRF-39019, except that the number of operations shall be 5,000.

3.8 Resistance or impedance. See table I.

3.9 Interrupting capacity. Interrupting capacity shall be in accordance with MIL-PRF-39019.

3.10 Dielectric withstanding voltage. Dielectric withstanding voltage shall be in accordance with MIL-PRF-39019.

3.11 Vibration. Vibration shall be in accordance with MIL-PRF-39019.

3.12 Insulation resistance. Insulation resistance shall be in accordance with MIL-PRF-39019.

3.13 Lever operating force. Lever operating force shall be in accordance with MIL-PRF-39019 except for the following: One-pole breaker: 7 pounds maximum; two-pole breaker: 10 pounds maximum; and three-pole breaker: 16 pounds maximum.

3.14 Auxiliary contacts. Auxiliary contacts shall be 0.5 amperes maximum at 120 V ac or 50 V dc.

3.15 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.16 Marking. Marking shall be as specified in MIL-PRF-39019, except the DSCC drawing PIN in accordance with 1.2 herein shall be used instead of the military PIN.

3.17 Certificate of compliance. A certificate of compliance shall be required from manufacturers requesting to be a suggested source of supply.

3.18 Workmanship. Parts shall be free of flash pits, voids, and excessive mold marks. Visible parting line is acceptable.

4. VERIFICATION

4.1 Conformance inspection.

4.1.1 Inspection of product for delivery. Inspection of product for delivery shall consist of group A inspection of MIL-PRF-39019.

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4.1.2 Certification. The acquiring activity, at its discretion, may accept a certificate of compliance with group A requirements in lieu of performing group A tests (see 6.2c).

4.1.3 Inspection of packaging. Inspection of packaging shall be in accordance with MIL-PRF-39019.

4.2 Shock.

4.2.1 Shock (100 g's).

- a. Mounting method: Normal mounting means.
- b. Test condition: Method 213 of MIL-STD-202, test condition C (100 g's, 6 ms).
- c. Electrical-load conditions and measurements: Of the three shocks in each direction required, two shocks shall be performed with the circuit breaker energized at 100 percent of rated current, at 12 V dc, except that for the directions with the operating lever pivot up (table mount) and the operating lever pivot down (ceiling mount), no voltage or current shall be applied. Each energized shock shall be monitored to determine opening of the main or auxiliary circuit breaker contacts. The remaining shock in each direction shall be performed with the circuit breaker contacts open and unenergized and shall be monitored to determine closing of the main or auxiliary contacts.

4.2.2 Shock (150 g's).

- a. Mounting method: Normal mounting means.
- b. Test condition: Special.
 - (1) Peak: 150 g's.
 - (2) Duration: 6 ms.
 - (3) Waveform: Sawtooth.
- c. Electrical-load conditions and measurements: Of the three shocks in each direction required, all shocks shall be performed with the circuit breaker energized at 100 percent of rated current at 12 V dc, except that for the directions with the operating lever pivot up (table mount), and the operating lever pivot down (ceiling mount), no voltage or current shall be applied.

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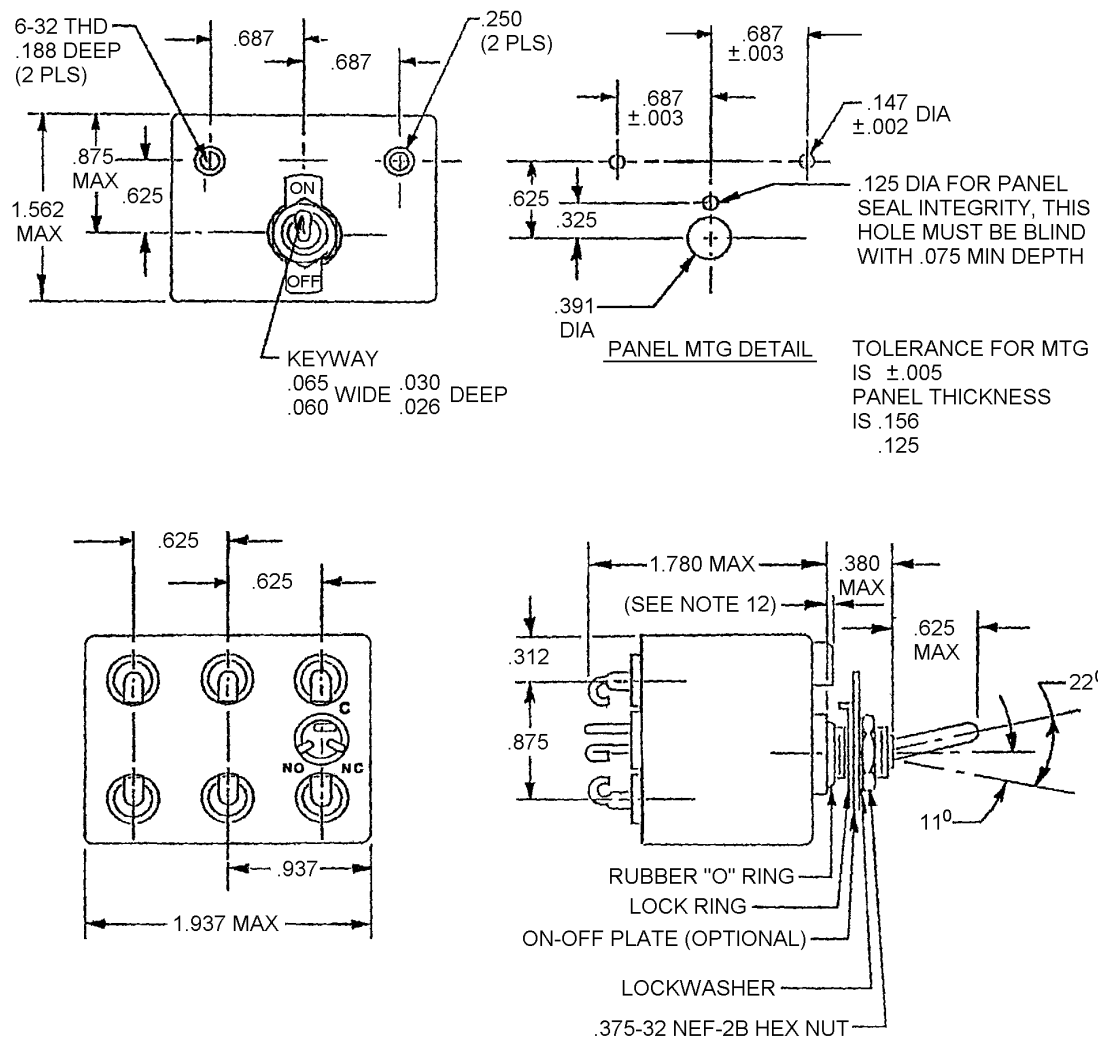


FIGURE 1. Interface and physical dimensions.

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| Inches | mm | Inches | mm |
|--------|------|--------|-------|
| .002 | 0.05 | .250 | 6.35 |
| .003 | 0.08 | .312 | 7.92 |
| .005 | 0.13 | .325 | 8.26 |
| .026 | 0.66 | .375 | 9.53 |
| .030 | 0.76 | .380 | 9.65 |
| .060 | 1.52 | .391 | 9.93 |
| .065 | 1.65 | .625 | 15.88 |
| .075 | 1.91 | .687 | 17.45 |
| .125 | 3.18 | .875 | 22.23 |
| .147 | 3.73 | .937 | 23.80 |
| .156 | 3.96 | 1.562 | 39.67 |
| .188 | 4.78 | 1.937 | 49.20 |

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is $\pm .031$ and $\pm 5^\circ$ on angles.
4. Envelope design optional.
5. Hex mounting nut .375-32 UNEF-2B thread, $.500 \pm .010$ across flats, $.093 \pm .005$ thick, brass nickel plated, AMS-QQ-N-290 nonglare, or stainless steel.
6. Internal tooth lockwasher, .507/.493 O.D., .392/.382 I.D., $.025 \pm .005$ thick, stainless steel.
7. Auxiliary contact terminals shall be located at the back side of the circuit breaker (same surface as main terminals), but otherwise their location, style, and design shall be optional, consistent with dimensional or other specified requirements. Auxiliary contact terminals shall accommodate 2 number 20 AWG wires.
8. The effective bushing thread length (not including mounting hardware) is .280 minimum.
9. Marking may appear on any surface except the mounting surface.
10. Lock ring not required if on-off plate has locking tab.
11. Numerical marking optional on circuit diagram.
12. Threaded inserts exceed seated height of bushing by .005 to .015.

FIGURE 1. Interface and physical dimensions - Continued.

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TABLE I. Circuit breaker dash number and applicable characteristics.

| PIN 87059- | Current rating (amps) | Time delay 1/ | Resistance or impedance (ohms - max) 2/ | | | PIN 87059- | Current rating (amps) | Time delay 1/ | Resistance or impedance (ohms - max) 2/ | | |
|---------------|-----------------------------|---------------------|--|-------|--------|---------------|-----------------------------|---------------------|--|-------|--------|
| | | | DC | 60 Hz | 400 Hz | | | | DC | 60 Hz | 400 Hz |
| 001 | 0.05 | A | 680.0 | 690.0 | 710.0 | 023 | 4.0 | A | 0.10 | 0.10 | 0.12 |
| 002 | 0.05 | B | 680.0 | 690.0 | 710.0 | 024 | 4.0 | B | 0.10 | 0.10 | 0.12 |
| 003 | 0.1 | A | 150.0 | 170.0 | 180.0 | 025 | 5.0 | A | 0.061 | 0.063 | 0.072 |
| 004 | 0.1 | B | 150.0 | 170.0 | 180.0 | 026 | 5.0 | B | 0.061 | 0.063 | 0.072 |
| 005 | 0.25 | A | 20.0 | 26.0 | 27.0 | 027 | 6.0 | A | 0.042 | 0.043 | 0.050 |
| 006 | 0.25 | B | 20.0 | 26.0 | 27.0 | 028 | 6.0 | B | 0.042 | 0.043 | 0.050 |
| 007 | 0.5 | A | 5.4 | 6.0 | 6.6 | 029 | 7.0 | A | 0.036 | 0.036 | 0.040 |
| 008 | 0.5 | B | 5.4 | 6.0 | 6.6 | 030 | 7.0 | B | 0.036 | 0.036 | 0.040 |
| 009 | 0.75 | A | 2.5 | 2.7 | 2.8 | 031 | 7.5 | A | 0.031 | 0.031 | 0.038 |
| 010 | 0.75 | B | 2.5 | 2.7 | 2.8 | 032 | 7.5 | B | 0.031 | 0.031 | 0.038 |
| 011 | 1.0 | A | 1.35 | 1.5 | 1.61 | 033 | 8.0 | A | 0.027 | 0.028 | 0.035 |
| 012 | 1.0 | B | 1.35 | 1.5 | 1.61 | 034 | 8.0 | B | 0.027 | 0.028 | 0.035 |
| 013 | 1.25 | A | 0.9 | 1.0 | 1.1 | 035 | 9.0 | A | 0.022 | 0.022 | 0.028 |
| 014 | 1.25 | B | 0.9 | 1.0 | 1.1 | 036 | 9.0 | B | 0.022 | 0.022 | 0.028 |
| 015 | 1.5 | A | 0.65 | 0.70 | 0.75 | 037 | 10.0 | A | 0.018 | 0.021 | 0.024 |
| 016 | 1.5 | B | 0.65 | 0.70 | 0.75 | 038 | 10.0 | B | 0.018 | 0.021 | 0.024 |
| 017 | 2.0 | A | 0.40 | 0.40 | 0.50 | 039 | 12.5 | A | 0.012 | 0.013 | 0.015 |
| 018 | 2.0 | B | 0.40 | 0.40 | 0.50 | 040 | 12.5 | B | 0.012 | 0.013 | 0.015 |
| 019 | 2.5 | A | 0.25 | 0.25 | 0.27 | 041 | 15.0 | A | 0.009 | 0.009 | 0.010 |
| 020 | 2.5 | B | 0.25 | 0.25 | 0.27 | 042 | 15.0 | B | 0.009 | 0.009 | 0.010 |
| 021 | 3.0 | A | 0.15 | 0.15 | 0.17 | 043 | 20.0 | A | 0.006 | 0.006 | 0.007 |
| 022 | 3.0 | B | 0.15 | 0.15 | 0.17 | 044 | 20.0 | B | 0.006 | 0.006 | 0.007 |

1/ All dash numbers include inertial delay with the time delay.

2/ The corresponding maximum wattage losses, which in no case shall exceed 3.0 watts, may be calculated as I^2R or I^2Z .

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TABLE II. Calibration tripping times (seconds) at +25°C ±2°C.

| Percent of rated current | Time delay A (fast) | | Time delay B (slow) | |
|---------------------------|---------------------|-------------------|---------------------|-------------------|
| | Min | Max | Min | Max |
| 100 | No trip 1 hour | No trip 1 hour | No trip 1 hour | No trip 1 hour |
| 150 | 0.2 | 7.0 | 3.0 | 70.0 |
| 200 | 0.055 | 2.0 | 0.5 | 20.0 |
| 400 | Inst <u>1/</u> | 0.24 | Inst <u>1/</u> | 1.75 |
| 600 | Inst <u>1/</u> | 0.13 | Inst <u>1/</u> | 0.6 |
| 800 | Inst <u>1/</u> | 0.06 | Inst <u>1/</u> | 0.1 <u>2/</u> |
| 800 at 60 Hz <u>3/</u> | No trip | No trip | No trip | No trip |
| 1,400 at 400 Hz <u>4/</u> | No trip | No trip | No trip | No trip |

1/ (Inst) instantaneous is defined as less than 0.015 second.

2/ This time is extended to 0.3 second for dc and 400 Hz.

3/ Eight hundred percent peak, one 1/2 sine pulse at 60 Hz.

4/ One thousand and four hundred percent peak, one 1/2 sine pulse at 400 Hz.

TABLE III. High and low temperature tripping times (seconds).

| Percent of rated current | Time delay A (fast) | | Time delay B (slow) | |
|---------------------------|---------------------|-------------------|---------------------|-------------------|
| | -40°C ± 2°C | +100°C ± 2°C | -40°C ± 2°C | +100°C ± 2°C |
| | Max | Min | Max | Min |
| 100 | No trip 1 hour | No trip 1 hour | No trip 1 hour | No trip 1 hour |
| 150 | 800.0 | --- | 1,000.0 | --- |
| 200 | 10.0 | 0.015 | 50.0 | 0.04 |
| 400 | 0.7 | Inst <u>1/</u> | 10.0 | Inst <u>1/</u> |
| 500 | 0.5 | Inst <u>1/</u> | 2.0 | Inst <u>1/</u> |
| 800 | 0.06 | Inst <u>1/</u> | 0.1 <u>2/</u> | Inst <u>1/</u> |
| 800 at 60 Hz <u>3/</u> | No trip | No trip | No trip | No trip |
| 1,400 at 400 Hz <u>4/</u> | No trip | No trip | No trip | No trip |

1/ (Inst) instantaneous is defined as less than 0.015 second.

2/ This time is extended to 0.3 second for dc and 400 Hz.

3/ Eight hundred percent peak, one 1/2 sine pulse at 60 Hz.

4/ One thousand and four hundred percent peak, one 1/2 sine pulse at 400 Hz.

4.2.3 Shock (200 g's).

- a. Mounting method: Normal mounting means.
- b. Test condition: Special.
 - (1) Peak: 200 g's.
 - (2) Duration: 1.5 ms.
 - (3) Waveform: Half-sine.
- c. Electrical-load conditions and measurements; Of the three shocks in each direction required, all shocks shall be performed with the circuit breaker energized at 100 percent rated current at 12 V dc, except that for the directions with the operating lever pivot up (table mount) and the operating lever pivot down (ceiling mount), no voltage or current shall be applied.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature which may be helpful, but is not mandatory.)

6.1 Intended use. Devices conforming to this drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for OEM application.

6.2 Ordering data. The contract or purchase order should specify the following:

- a. Complete PIN (see 1.2).
- b. Requirements for delivery of one copy of the conformance inspection data or certificate of compliance that parts have passed conformance inspection with each shipment of parts by the manufacturer.
- c. Whether the manufacturer performs the group A tests or provides certification of compliance with group A requirements.
- d. Requirements for notification of change of product to the contracting activity, if applicable.
- e. Requirements for packaging and packing.

6.3 Users of record. Coordination of this document for future revisions are coordinated only with the suggested sources of supply and the users of record of this document. Requests to be added as a recorded user of this drawing should be in writing to: Defense Supply Center, Columbus, ATTN: DSCC/VAT, Post Office Box 3990, Columbus, OH 43218-3990 or by telephone (614) 692-0556 or DSN 850-0556.

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6.4 Suggested sources of supply. Suggested sources of supply are listed herein. Additional sources will be added as they become available. For assistance in the use of this drawing, contact Defense Supply Center, Columbus, ATTN: DSCC-VAT, Post Office Box 3990, Columbus, OH 43218-3990 or by telephone (614) 692-0556 or DSN 850-0556.

| DSCC drawing PIN 87059-1/ | Vendor similar designation or type number 2/ | Vendor CAGE | Vendor name and address |
|---------------------------------|--|----------------|--|
| 001 | AP112-R-87059-001 | 81541 | Airpax Corporation 807 Woods Road P.O. Box 520 Cambridge, MD USA 21613-0520 Phone: 410-228-1500 Fax:410-228-3456 |
| 002 | AP112-R-87059-002 | | |
| 003 | AP112-R-87059-003 | | |
| 004 | AP112-R-87059-004 | | |
| 005 | AP112-R-87059-005 | | |
| 006 | AP112-R-87059-006 | | |
| 007 | AP112-R-87059-007 | | |
| 008 | AP112-R-87059-008 | | |
| 009 | AP112-R-87059-009 | | |
| 010 | AP112-R-87059-010 | | |
| 011 | AP112-R-87059-011 | | |
| 012 | AP112-R-87059-012 | | |
| 013 | AP112-R-87059-013 | | |
| 014 | AP112-R-87059-014 | | |
| 015 | AP112-R-87059-015 | | |
| 016 | AP112-R-87059-016 | | |
| 017 | AP112-R-87059-017 | | |
| 018 | AP112-R-87059-018 | | |
| 019 | AP112-R-87059-019 | | |
| 020 | AP112-R-87059-020 | | |
| 021 | AP112-R-87059-021 | | |
| 022 | AP112-R-87059-022 | | |
| 023 | AP112-R-87059-023 | | |
| 024 | AP112-R-87059-024 | | |
| 025 | AP112-R-87059-025 | | |
| 026 | AP112-R-87059-026 | | |
| 027 | AP112-R-87059-027 | | |
| 028 | AP112-R-87059-028 | | |
| 029 | AP112-R-87059-029 | | |
| 030 | AP112-R-87059-030 | | |
| 031 | AP112-R-87059-031 | | |
| 032 | AP112-R-87059-032 | | |
| 033 | AP112-R-87059-033 | | |
| 034 | AP112-R-87059-034 | | |
| 035 | AP112-R-87059-035 | | |
| 036 | AP112-R-87059-036 | | |
| 037 | AP112-R-87059-037 | | |
| 038 | AP112-R-87059-038 | | |
| 039 | AP112-R-87059-039 | | |
| 040 | AP112-R-87059-040 | | |
| 041 | AP112-R-87059-041 | | |
| 042 | AP112-R-87059-042 | | |
| 043 | AP112-R-87059-043 | | |
| 044 | AP112-R-87059-044 | | |

1/ Parts must be purchased to this DSCC PIN to assure all performance requirements and tests are met.

2/ Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

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